

# Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



# Circular No. 769

February 1948 • Washington, D. C.

UNITED STATES DEPARTMENT OF AGRICULTURE



## NEW MUSCADINE GRAPES<sup>1</sup>

By CHARLES DEARING, *associate horticulturist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration*

### CONTENTS

	Page		Page
Origin of perfect-flowered varieties.....	3	Descriptions of 15 new muscadine varieties—Continued	
Value of species hybrids.....	6	Kilgore.....	13
Originating new muscadine varieties.....	7	Morrison.....	14
Parentage of 15 new muscadine varieties.....	7	New River.....	16
Descriptions of 15 new muscadine varieties.....	9	Onslow.....	17
Burgaw.....	9	Orton.....	17
Cape Fear.....	9	Pender.....	19
Creswell.....	10	Stanford.....	19
Duplin.....	12	Tarheel.....	22
		Topsail.....	23
		Wallace.....	25
		Willard.....	26

In 1905, the Bureau of Plant Industry, of the United States Department of Agriculture, organized research work on muscadine grapes (*Vitis rotundifolia* Michx.) because it recognized the possibilities inherent in this species. It is native and especially adapted to the Southeastern States, possessing some remarkable characters very distinct from those of other grapes.<sup>2</sup> For example, a complete crop failure of this grape has never been known in the more than 35 years the experimental vineyard has been in operation at Willard, N. C. The vines lend themselves to arbors, and the fruit is attractive on the vine

<sup>1</sup> The author gives credit as follows: To E. F. Cole, formerly scientific assistant, Bureau of Plant Industry, who obtained the original seed from T. V. Munson and made the original crosses at New Smyrna, Fla., in 1907; to members of the New York State Agricultural Experiment Station and to Elmer Snyder, senior pomologist, and Fred Husmann, formerly superintendent, who mailed pollen of American bunch grapes from New York and New Jersey and of European grapes (*Vitis vinifera*) from California for use in breeding work at Willard, N. C.; to George C. Husmann, formerly pomologist, and especially to C. A. Magoon, formerly senior pomologist, in charge of the viticultural investigations, of the Bureau of Plant Industry, Soils, and Agricultural Engineering, who assisted in the field with studies of the seedlings and selections.

<sup>2</sup> DEARING, C. MUSCADINE GRAPES. U. S. Dept. Agr. Farmers' Bul. 1785, 29 pp., illus. 1947. (Revised.)

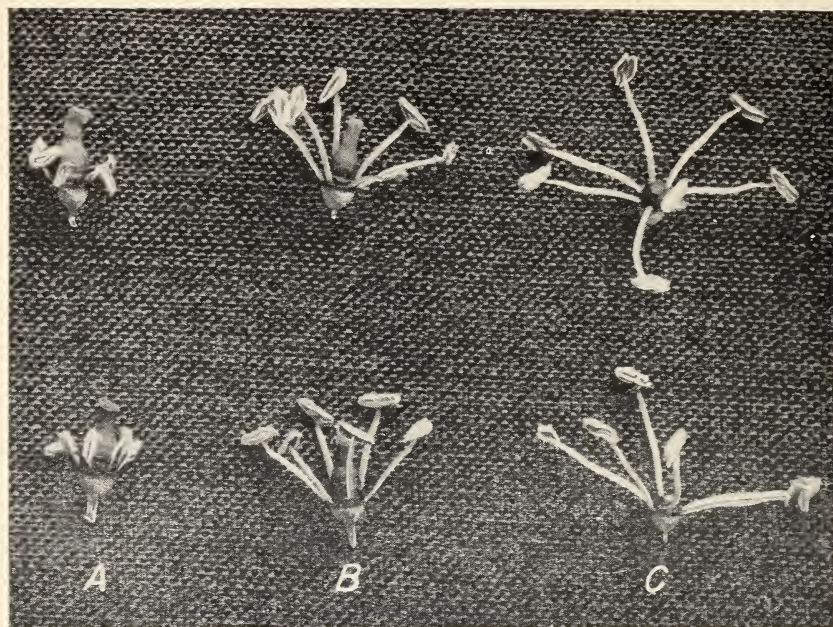


FIGURE 1.—Blossom types of muscadine grapes: *A*, Self-sterile, pistillate blossoms; *B*, perfect blossoms, as found on self-fertile, hermaphrodite varieties; *C*, staminate blossoms.

and has a distinctive and delightful flavor. The vines and fruit are so resistant to diseases and insects that spraying has rarely been necessary, making the muscadine grape an ideal fruit for home gardens.

It was hoped that by close study in the field and by careful, systematic plant-breeding work new varieties and new methods of culture might result in the origin of better varieties for home use and in the development of a considerable grape industry in the Southeastern States. This region, characterized by long, warm, humid growing seasons, is well adapted to the production of the relatively disease-resistant muscadine grape; but it is not well adapted to varieties, such as Concord, derived largely from the northeastern fox grape (*Vitis labrusca* L.), or to varieties, such as Tokay, derived from *V. vinifera* L., on which the grape industry in California is based.

The earliest work on muscadine grapes consisted of field surveys and of studies (1) of the species in the wild, (2) of the better wild plants brought under culture and given names, and (3) of the markets and uses of these grapes. As these studies went forward the best plant material was sent to Willard, N. C., where the Bureau established a cooperative muscadine grape vineyard at the Coastal Plain Branch Station, of the North Carolina Agricultural Experiment Station. There the soil and topography are typical of much of the southeastern Coastal Plain region of the United States.

In addition to cultural, pollination, and utilization studies investigations on pruning and training and extensive plant-breeding work were



undertaken at Willard. Numerous crosses were made, and a large number of seedlings were produced and tested. Although many interesting seedlings have appeared and the most promising have been sent throughout the southeastern United States for testing, heretofore none have been formally introduced. The Bureau is now introducing and recommending a group of 15 selections for planting in home collections and for commercial purposes in the Southern States. It is the purpose of this circular to name and describe these introductions. These make available for the first time perfect-flowered varieties, which produce fruit when planted with no male vines in the vicinity. They also make vineyards more productive, because perfect-flowered varieties can be used instead of the nonfruiting male vines for pollinating pistillate, or female, varieties.

## ORIGIN OF PERFECT-FLOWERED VARIETIES

An outstanding feature of the breeding work conducted by the Bureau at the Coastal Plain Branch Station has been the production of hermaphrodite (perfect-flowered and self-fertile) varieties. When the breeding work was started all muscadine vines were of either a pistillate (female) type or a staminate (male) type. Male vines bear no fruit, but they produce flowers with fertile pollen. Female vines have perfect, functioning pistils, but only rudimentary stamens. When cross-pollinated by the fertile pollen of the male flowers the female vines produce fruit, but are incapable of self-pollination and of cross-pollination of other vines (figs. 1 and 2).



FIGURE 2.—Bloom-cluster types of muscadine grapes: *A*, Staminate cluster; *B*, perfect-flowered, self-fertile, hermaphrodite cluster; *C*, pistillate cluster.

Crosses could be obtained, therefore, only through the use of male vines. However, among the thousands of seedlings produced there was observed one seedling, vine 23 in row 4 of block 2 (V23 R4 B2), a cross of Eden by the Mission male, which had both fertile pollen in upright stamens and a perfect, well-developed pistil in the same flower (fig. 3). All flowers on this plant were of this new hermaphrodite, or perfect-flowered, type. Tests showed that both the pollen and the pistil were functional; furthermore, seed derived by crossing Eden with this plant yielded about 60 percent perfect-flowered and 40 percent female plants. As this is the normal proportion of male to female and the size of the flower cluster was like that of the male, it appeared that in this first perfect-flowered seedling the rudimentary pistil of the male type had become a functioning pistil, resulting in a perfect-flowered, large-sized cluster with fertile pistils and fertile stamens.



FIGURE 3.—Original hermaphrodite, or perfect-flowered, muscadine grape as it appeared June 23, 1911.





FIGURE 4.—Second perfect-flowered muscadine grape at flowering time in June 1914, showing clusters bagged for use in breeding work. Note that the trunk of the vine is bent over to fit a newly built low trellis.

Although this original perfect-flowered vine produced fruit and its pollen was satisfactory for the setting of fruit on Eden and other varieties, 6 of its clusters, when bagged and jarred daily, failed to set fruit, suggesting that it might be self-sterile. After it had been used in breeding one season, it was killed back in the severe winter of 1911-12. It resprouted, however, and was used later in further breeding work; some berries were produced by selfing, but it was not very self-fertile. However, it set good crops when cross-pollinated. Of 44 seedlings of the same cross fruiting in 1911 only this was a hermaphrodite.

The following season (1912) additional seedlings in the experimental vineyard bloomed for the first time. A careful check of the blossom type of all seedlings resulted in the discovery of the second perfect-flowered seedling, vine 19 in row 7 of block 2 (V19 R7 B2) (figs. 4 and 5). It was one of a group of seven seedlings of Scuppernong, pollinated by a wild white staminate vine at New Smyrna, Fla. This seedling, like V23 R4 B2, was perfect-flowered and proved to be both self-fertile and cross-fertile. It set fruit readily in bags. Its growing tips showed it to have the white fruiting character, and later the fruit proved to be much like that of Scuppernong in color and appearance.

From a beginning with these two perfect-flowered seedlings many other perfect-flowered ones have been bred. The two originals and the subsequent ones have been crossed with the standard varieties, and from the resulting seedlings varieties resembling somewhat the better standard sorts but having the perfect-flowered instead of the pistillate character have been selected. Several of the better selections are listed among the introductions described in this circular. With further breeding much better hermaphrodites may be obtained, but those that

have already been produced warrant introduction for use by plant breeders and for planting in vineyards as pollinizing vines that also bear fruit. The use of these perfect-flowered varieties means that vineyard yields can be increased a minimum of 10 percent, for they instead of nonbearing male vines can be planted as pollinizers. Heretofore 1 male vine to every 8 pistillate, or fruiting, vines has been recommended for planting for best crop production.

Although hundreds of perfect-flowered seedlings have been raised from the two original ones, only two others of distinctly different parentages have been produced. As these two seedlings had inferior fruit qualities and unpromising parentage, they were not used in breeding operations and eventually were discarded. These were V38 R24 B4, resulting from a cross of V16 R6 B2 ♀ × V46 R9 B2 ♂, both of which were seedlings derived from muscadine grapes furnished by T. V. Munson as foundation material for breeding work; and V21 R46 B4, derived from a cross of James × Eden. Both James and Eden, although classified as pistillate, appear to produce occasional fertile pollen grains. In this cross the quality of the fruit was poor and the berries were small and of the Eden variety type.

### VALUE OF SPECIES HYBRIDS

In order to utilize fully the valuable qualities of the muscadine grape in the early stages of the breeding work, many crosses were made between the muscadine grapes and both the North American bunch grapes and the European grapes grown on the Pacific coast. Through the cooperation of New York State Agricultural Experiment Station workers and United States Department of Agriculture workers in California and New Jersey, pollen was shipped to Willard, N. C., by mail and used there for cross-pollination. A number of hybrids of muscadine × North American bunch grape and muscadine × Euro-

pean grape parentage were produced, but all the seedlings were either weak and abnormal or if vigorous were without fruit. In most berries borne by these hybrids seeds appeared to be poorly developed. A few normal berries with apparently normal seeds were produced. The prospects from such breeding, however, seem limited because so many of the seedlings were sterile and many of them were lacking in vigor. Extensive hybridization work or new methods may still produce desirable material; if the work is extended for several generations, it might be possible to develop some very fine hybrid grapes.



FIGURE 5.—White fruit of the second perfect-flowered muscadine grape. × 1.



## ORIGINATING NEW MUSCADINE VARIETIES

In the breeding work most attention was given to the breeding of better varieties within the muscadine species. The objective was the production of perfect-flowered varieties of good quality and of varieties with higher sugar content, thinner skin, better pulp quality, smaller seeds, and larger bunches.

In order to provide working material for cross-breeding, seeds of standard muscadine varieties were procured in 1907 from the famous breeder of grapes, T. V. Munson, Denison, Tex. Crosses were also made at New Smyrna, Fla., in the same year. Scuppernong, James, Thomas, and Flowers were crossed with several local outstanding male vines, one of which was designated Mission because it grew wild over the ruins of an old Spanish mission. Seeds from these crosses and also those obtained from Mr. Munson were germinated and grown at Arlington Experiment Farm, Arlington, Va., and the resulting seedlings were planted at Willard, N. C., in the springs of 1908 and 1909 as the beginning of the breeding work. These seedlings were fruited; and the better ones were crossed with standard varieties, outstanding seedlings, local varieties found on field surveys throughout the Southeast, and wild male vines, to produce a second generation from which selections were again made. It was in this first group of seedlings that the first perfect-flowered seedling (p. 4) was found. Thousands of seedlings have been grown and tested, and finally from this group 15 have been selected for naming and introduction.

Most of the selections have been in the experimental vineyard of the Department of Agriculture for a number of years. Each has distinctive characters and special merit for at least certain purposes. These 15 varieties are not considered as the last word of perfection in muscadine grapes, but they represent a stepping stone in the long process of breeding, selection, and testing for the improvement of muscadine grapes. Brief descriptions of them are given on pages 9 to 28.

## PARENTAGE OF 15 NEW MUSCADINE VARIETIES<sup>3</sup>

Pedigree diagrams of the selections described on pages 9 to 28 may prove helpful.<sup>3</sup> The parentage of each selection is carried back to the Arlington Experiment Farm number representing the original material used as a starting point for the breeding work. The original selection number of each is given. For example, Burgaw was V4 R27 B4, that is, vine 4 in row 27 of block 4 at Willard, N. C.; Cape Fear was the fifty-fifth selection in block 4. The pedigrees follow:

1. Burgaw (V4 R27 B4) ♀  $\left\{ \begin{array}{l} \text{Thomas } \text{♀} \text{ (origin, Marion, N. C.)} \\ \text{V19 R7 B2 } \text{♀} \left\{ \begin{array}{l} \text{Scuppernong } \text{♀} \text{ (origin,} \\ \text{Tyrrell County, N. C.)} \\ \text{White native } \text{♂} \text{ (origin,} \\ \text{New Smyrna, Fla.)} \end{array} \right. \end{array} \right.$

<sup>3</sup>The symbols used in these diagrams are interpreted as follows: ♀, Pistillate, or female; ♀, hermaphrodite, or perfect-flowered; ♂, staminate, or male; V, vine; R, row; B, block; AF, Arlington Experiment Farm; Sel., selection.

2. Cape Fear (Sel. 55 B4) ♀  $\left\{ \begin{array}{l} \text{Burgaw } \text{♂} \text{ (see p. 7)} \\ \text{V20 R36 B4 } \text{♂} \left\{ \begin{array}{l} \text{V80 R3 B2 } \text{♀} \text{ (seed from} \\ \text{Denison, Tex.)} \\ \text{V19 R7 B2 } \text{♂} \text{ (see} \\ \text{above)} \end{array} \right. \end{array} \right.$
3. Creswell ♀ (found on farm of F. R. White, Creswell, N. C.)
4. Duplin (Sel. 83 B6) ♂  $\left\{ \begin{array}{l} \text{Stanford } \text{♀} \text{ (see below)} \\ \text{V10 R15 B4 } \text{♂} \left\{ \begin{array}{l} \text{Eden } \text{♀} \text{ (origin, Georgia)} \\ \text{V23 R4 B2 } \text{♂} \left\{ \begin{array}{l} \text{Eden } \text{♀} \text{ (see} \\ \text{above)} \\ \text{Mission } \text{♂} \\ \text{(origin,} \\ \text{New Smyrna, Fla.)} \end{array} \right. \end{array} \right. \end{array} \right.$
5. Kilgore (V80 R3 B2) ♀  $\left\{ \begin{array}{l} \text{Labama } \text{♀} \left\{ \begin{array}{l} \text{San Jacinto} \\ \text{(? ) Brilliant} \end{array} \right. \\ \text{? } \text{♂} \end{array} \right.$
6. Morrison (V63 R11 B2) ♀  $\left\{ \begin{array}{l} \text{Scuppernong } \text{♀} \text{ (see above)} \\ \text{White native } \text{♂} \text{ (AF 7082)} \end{array} \right.$
7. New River (V48 R9 B2) ♀ (from seed of San Jacinto from Denison, Tex.)
8. Onslow (Sel. 6 B8) ♀  $\left\{ \begin{array}{l} \text{V22 R5 B4 } \text{♀} \left\{ \begin{array}{l} \text{James } \text{♀} \text{ (origin, Pitt County,} \\ \text{N. C.)} \\ \text{V66 R3 B2 } \text{♂} \left\{ \begin{array}{l} \text{Eden } \text{♀} \text{ (see} \\ \text{above)} \\ \text{White native } \text{♂} \\ \text{(AF 7051)} \end{array} \right. \end{array} \right. \\ \text{Burgaw } \text{♂} \text{ (see above)} \end{array} \right.$
9. Orton (Sel. 22 B6) ♀  $\left\{ \begin{array}{l} \text{Latham } \text{♀} \text{ (origin, New Bern, N. C.)} \\ \text{Burgaw } \text{♂} \text{ (see above)} \end{array} \right.$
10. Pender (Sel. 25 B6) ♂  $\left\{ \begin{array}{l} \text{Latham } \text{♀} \text{ (see above)} \\ \text{V20 R36 B4 } \text{♂} \text{ (see above)} \end{array} \right.$
11. Stanford (V47 R9 B2) ♀ (from seed of San Jacinto from Denison, Tex.)
12. Tarheel (Sel. 42 B6) ♂  $\left\{ \begin{array}{l} \text{Luola } \text{♀} \text{ (origin, Lumberton, N. C.)} \\ \text{V68 R14 B4 } \text{♂} \left\{ \begin{array}{l} \text{Eden } \text{♀} \text{ (see above)} \\ \text{V23 R4 B2 } \text{♂} \text{ (see above)} \end{array} \right. \end{array} \right.$
13. Topsail (Sel. 15 B6) ♀ (same parentage as Orton)
14. Wallace (Sel. 2 B8) ♂  $\left\{ \begin{array}{l} \text{V26 R5 B4 } \text{♀} \left\{ \begin{array}{l} \text{James } \text{♀} \text{ (see above)} \\ \text{V66 R3 B2 } \text{♂} \left\{ \begin{array}{l} \text{Eden } \text{♀} \text{ (see} \\ \text{above)} \\ \text{Native } \text{♂} \end{array} \right. \end{array} \right. \\ \text{Willard } \text{♂} \text{ (see p. 9)} \end{array} \right.$

15. Willard (V36 R36 B4) ♂  $\left\{ \begin{array}{l} \text{V47 R9 B2 } \varnothing \text{ (a white selection, AF 5130)} \\ \text{V19 R7 B2 } \varnothing \left\{ \begin{array}{l} \text{Scuppernong } \varnothing \text{ (see above)} \\ \text{White native } \sigma \text{ (see above)} \end{array} \right. \end{array} \right.$

## DESCRIPTIONS OF 15 NEW MUSCADINE VARIETIES

### BURGAW

#### ORIGIN

Burgaw was named for the town of Burgaw, N. C., county seat of Pender County, where the experimental vineyard was located. It resulted from a cross of Thomas pollinated by the second perfect-flowered selection found. While some seedlings of this cross might be white-fruited because the pollen parent was white-fruited, most of them would probably be dark like Burgaw because Thomas seems to be a pure dark.

#### GENERAL CHARACTERISTICS

Burgaw is a dark-fruited, highly self-fertile variety of Thomas parentage. The fruit quality is much like that of Thomas, being sweet and sprightly in flavor and of a dark reddish-black color. Except for being perfect-flowered, this selection is much like Thomas. It is one of the most productive varieties. Like Thomas, it is a good vineyard variety, producing each year an abundant fruit crop as well as ample new wood for the next year.

#### TECHNICAL DESCRIPTION

*Vines*.—Very vigorous; lateral growth rather short; foliage abundant, dense, very disease-resistant, maturing late, thus protecting the fruit; leaves broadly cordate; growing tips reddish green.

*Flowers*.—Perfect; cluster of male type, medium-sized.

*Fruit*.—Ripening about midseason; stem of cluster 1 inch long; cluster loose, open, consisting of 1 to 6 berries; berries of good adherence (better than those of Thomas), medium-sized, round, shiny, reddish black; skin medium thick, tough; pulp rather tenacious, making seed liberation difficult, smooth, sprightly to the taste, fairly sweet; seeds fairly small.

### CAPE FEAR

#### ORIGIN

Cape Fear was named for the Cape Fear River and the Cape Fear section of southeastern North Carolina. It is a pistillate variety, resulting from the crossing of two perfect-flowered varieties. Burgaw was the female parent, while the male parent was a cross of a pistillate variety pollinated by the second perfect-flowered grape. Thus, the second original perfect-flowered selection entered into this variety from both the male and the female parent. Although Cape Fear is pistillate, it would be reasonable to expect perfect-flowered seedlings



to show up in its offspring because it resulted from a cross of two perfect-flowered varieties and an original perfect-flowered selection is back of both parents.

#### GENERAL CHARACTERISTICS

Cape Fear is a very late, white-fruited, pistillate variety, having good-sized clusters of fairly large berries. The vine is productive, vigorous, and fairly free from disease. The fruit is borne in fine clusters of 6 to 8 medium-sized to large berries. The berries have good adherence to the stem. One observer described the variety as having a good, sweet, malic (apple-pear) flavor, thin skin, and smooth, tender pulp. It is recommended as a late white variety for the variety-collection vineyard, for table use late in the season, and probably for plant breeders.

#### TECHNICAL DESCRIPTION

*Vines*.—Average in vigor and of less than average density; growth open, upright; foliage of about average disease resistance, maturing and falling early, thus exposing the fruit; leaves of normal shape, but somewhat crinkly or wavy; growing tips yellowish green.

*Flowers*.—Pistillate; cluster of medium pistillate type, slightly larger than that of Scuppernong.

*Fruit*.—Ripening very late; stem of cluster short,  $\frac{1}{2}$  to 1 inch long; cluster large, round, compact, consisting of 1 to 15, usually 6 to 8, berries; berries of good adherence, medium-sized to large, slightly oval, pearly greenish yellow; skin thin to medium thick, rather tough; pulp under the skin of normal amount and character, medium juicy, tenacious, smooth, meaty, soft, fairly acid, only moderately sweet, of good flavor; seeds medium-sized.

#### CRESWELL

##### ORIGIN

Creswell was discovered on the farm of F. R. White, Creswell, N. C. Its merits have been tested in connection with the breeding work, and it is so good that it is included in this circular. The Department of Agriculture obtained plant material from the original vine and planted it under test in the Willard vineyard.

#### GENERAL CHARACTERISTICS

Creswell has become recognized as one of the better, late-ripening, pistillate varieties (fig. 6). The fruit is black when fully ripe, but its color also suggests the dark red of Thomas. The berries are large and adhere well to the stem; they hang on till frost, getting sweeter all the time. They have "pop and zip" which, together with a good flavor, make this a choice eating variety. It is at its best in the early morning or late at night, when the berries are cool. Visitors have frequently rated it the best eating grape in the vineyard. The vines are vigorous and always produce a good crop. At the same time they make adequate wood growth for the next year. Creswell has a long ripening season and because of its excellent dessert quality should be appreciated in the home vineyard. Its juiciness and sweetness also make it an acceptable variety for sale to wine makers.

## TECHNICAL DESCRIPTION

*Vines*.—Average in vigor and productiveness; growth rangy, drooping; foliage normally dense, persistent, of average disease resistance and normal maturity date; leaves of normal shape; growing tips reddish green.

*Flowers*.—Pistillate; cluster of pistillate type.

*Fruit*.—Ripening rather late, but good to eat considerably before fully ripe, berries becoming red ripe and then black ripe; stem of cluster  $\frac{1}{2}$  to 1 inch long; cluster round, compact, consisting of 1 to 15 berries; berries of very good adherence, large, round, black when fully ripe; skin medium thick, tough; pulp under the skin average in amount, juicy, sprightly, meaty, smooth, slightly acid, but with high sugar content; fruit crisp when cold, "popping" as the berries are crushed; seeds medium-sized, typical of muscadine species.

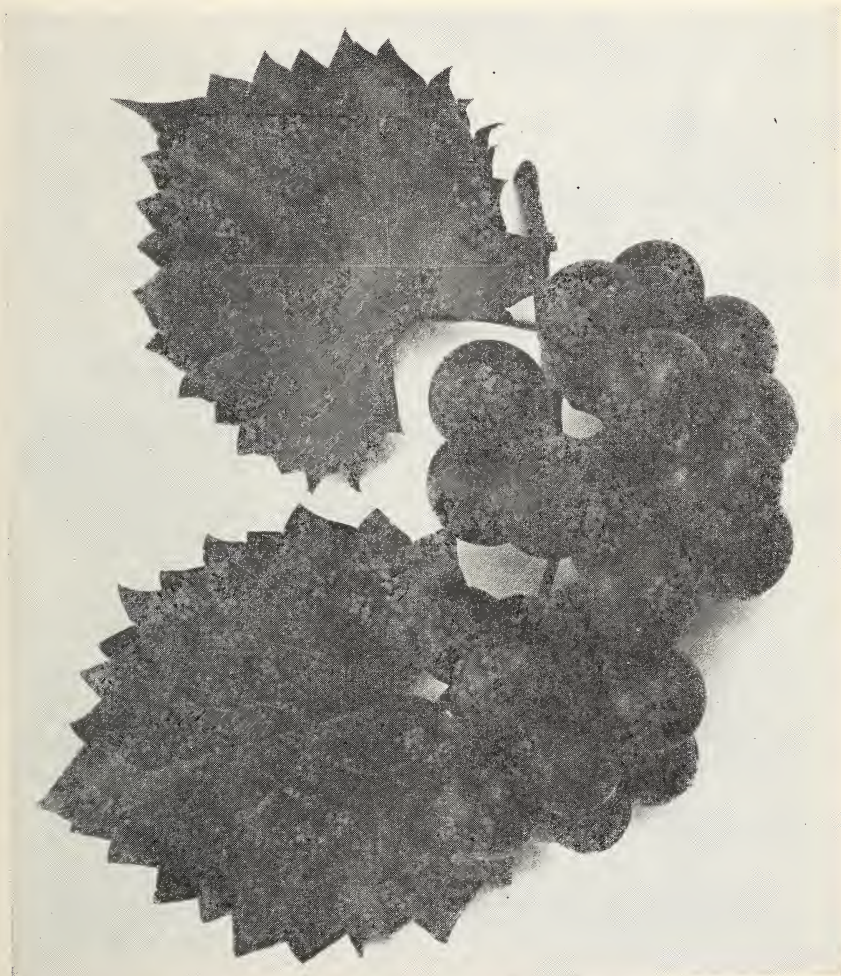


FIGURE 6.—Fruit and leaves of the Creswell, a late, black-fruited, pistillate, table muscadine grape of highest flavor.  $\times$  about  $\frac{7}{10}$ .



## DUPLIN

## ORIGIN

Duplin was named for Duplin County, N. C., which is just north of the experimental vineyard. It resulted from a cross of Stanford (p. 19) pollinated by a perfect-flowered seedling. This perfect-flowered seedling was the result of a cross between Eden and the first perfect-flowered seedling.

## GENERAL CHARACTERISTICS

Duplin is a dark-fruited, perfect-flowered variety (fig. 7). It is somewhat distinctive in that the berries are definitely oval, like those



FIGURE 7.—Fruit and leaves of the Duplin, an interesting perfect-flowered muscadine grape with large, loose clusters and distinctly soft, dark berries.  $\times$  about  $\frac{3}{5}$ .



of Pender, rather soft, and borne in loose, straggly clusters. Though so soft as to suggest that the juice has dried out, the fruit is still attractive. Although the fruit is not of the highest quality, it has pleasing characters that might be of value to plant breeders.

#### TECHNICAL DESCRIPTION

*Vines*.—Vigorous, rangy; canes relatively few, making an open vine; foliage also open, of average disease resistance; leaves at the base of canes tending to mature early, exposing the fruit to view; growing tips reddish green.

*Flowers*.—Perfect; cluster of male type, fairly large.

*Fruit*.—Ripening in midseason; stem of cluster  $1\frac{1}{2}$  to 2 inches long; cluster long, loose, appearing to drag down like a wet rag; berries of good adherence, medium-sized to large, definitely oval, soft, dull black; skin medium thick, medium tough; pulp abundant under the skin, soft, good in quality, moderately juicy, moderately acid, sweet, of just average flavor; seeds of above-average size.

### KILGORE

#### ORIGIN

Kilgore was named for Dr. W. B. Kilgore, a former chemist in the North Carolina Department of Agriculture and a former director of the North Carolina Agricultural Experiment Station, who gave much aid in his official capacity to the muscadine grape investigations and was particularly fond of this variety because of its peculiar character of having a very melting pulp, which released the seeds at once. It came from seed of Labama, which Munson described as being a seedling of San Jacinto probably pollinated by Brilliant. However, San Jacinto and Labama show no evidence of hybridity.

#### GENERAL CHARACTERISTICS

Kilgore is a pistillate variety bearing white fruit with a reddish tinge (fig. 8); it is very productive and is distinctive because of its very melting pulp. Because of this melting pulp the fruit, unless fully ripe, seems a little acid, although it is still good in flavor. The berries come in clusters generally of 6 to 10, and they adhere to the stem unusually well for muscadine grapes. The cluster has a stem long enough so that it can be readily picked, and the fruit is attractive in appearance, being somewhat translucent, which makes it a useful variety for fancy baskets. It is a variety that also may be useful to plant breeders.

#### TECHNICAL DESCRIPTION

*Vines*.—Medium vigorous; growth habit normal; foliage average in amount, rather disease-susceptible, maturing early; leaves cordate, pointed; growing tips yellowish green.

*Flowers*.—Pistillate; cluster of pistillate type.

*Fruit*.—Ripening in late midseason; stem of cluster about 1 inch long, the fruit being easily picked by breaking the stem; cluster fairly compact, consisting of 1 to 22, generally 6 to 10, berries; berries of very good adherence, medium-sized, round, green to pinkish bronze, depending somewhat on exposure to the sun; skin medium thick, medium tough; pulp fairly juicy, very melting, so soft that it becomes a part of the juice, being broken into small parts, tending to be acid

since the juice inside the pulp is immediately freed, of rather good flavor; seeds medium-sized, rather pointed.



FIGURE 8.—Fruit and leaves of the Kilgore, a white-fruited, pistillate muscadine grape with very melting pulp.  $\times$  about  $\frac{7}{10}$ .

### MORRISON

#### ORIGIN

Morrison was named many years ago for Cameron Morrison, a former Governor of North Carolina, when he was the speaker on one of the annual field days at the Willard Station. It was the result of crossing Scuppernong with pollen of a white staminate seedling.

## GENERAL CHARACTERISTICS

Morrison is a very early, white-fruited variety of the Scuppernong type (fig. 9). It has already been distributed to some extent for testing purposes. It has proved successful wherever grown, even though it is not so vigorous as some of the other muscadine grapes. It needs fertilizer to keep up its wood growth. It is a very early, white-fruited, pistillate variety, better in fruit qualities than Scuppernong. The fruit has a slightly pinkish tinge that makes it very attractive. The berries are soft and the pulp is exceedingly smooth and pleasing. It is recommended because of its earliness and fine dessert quality. The berries are large, and the juice is sweet. The berries tend to shatter as they ripen. It is a particularly fine variety for home planting.

## TECHNICAL DESCRIPTION

*Vines*.—Definitely weak, tending to be slightly upright; foliage plentiful, of medium disease resistance, maturing fairly early but hanging on sufficiently well to protect the fruit; leaves medium-sized, generally cordate, pointed, with fine serrations; growing tips yellowish green.

*Flowers*.—Pistillate; cluster of pistillate type, medium-sized.

*Fruit*.—Ripening very early; stem of cluster 1 inch long; cluster fairly round, consisting of 1 to 8, generally 3 to 5, berries; berries of only fairly good adherence, tending to shell when ripe, but if picked promptly on ripening none will be lost,



FIGURE 9.—Fruit and leaves of the Morrison, a very early, white-fruited, pistillate muscadine grape of highest quality.  $\times$  about  $\frac{4}{5}$ .



large, round, of very attractive greenish color with a slightly pinkish tinge; skin medium thick, medium tender: pulp abundant, soft, very smooth, juicy, sweet, of best quality, medium acid, better than Scuppernong in flavor; seeds medium large.

## NEW RIVER

### ORIGIN

The New River variety bears the name of a relatively small but well-known river of the part of eastern North Carolina where the experimental vineyard was located. It was one of the original seedlings grown at Arlington Experiment Farm and came from seed of Scuppernong furnished by T. V. Munson, Denison, Tex.

### GENERAL CHARACTERISTICS

The fruit of New River is much like that of Scuppernong in color except that the berries tend to have a little more reddish-bronze tinge (fig. 10). One characteristic that makes the variety desirable is that it ripens earlier than Scuppernong and thus serves as an early white variety of good size, of which there are few. Its season is about the same as that of Memory, the standard early black dessert variety. The adherence of berry to stem is better than that of Scuppernong, but the flavor is not so good.



FIGURE 10.—Fruit and leaves of the New River, an early, white-fruited, pistillate, table muscadine grape.  $\times$  about  $\frac{7}{10}$ .

## TECHNICAL DESCRIPTION

*Vines*.—Medium vigorous; growth open; canes few, strong; foliage moderately abundant, only fairly disease-resistant, maturing fairly early; leaves tending to curl upward on the sides, cordate, pointed, with moderate serration; growing tips green.

*Flowers*.—Pistillate; cluster of Scuppernong type, small.

*Fruit*.—Ripening very early; stem of cluster  $1\frac{1}{2}$  to 2 inches long; cluster moderately loose, consisting of 1 to 7 berries; berries of good adherence, medium-sized to large (mostly large), slightly oblong, a little flat at point of attachment, reddish-bronze white; skin medium thick, tough; pulp juicy, smooth, fairly tender, acid to the taste, but free-run juice sweet; seeds medium-sized.

## ONSLow

## ORIGIN

Onslow was named for Onslow County, N. C., near the experimental vineyard. It resulted from a cross of a white-fruited seedling with pollen of Burgaw, a perfect-flowered variety. The female parent resulted from a cross of James pollinated by a selection that resulted from a cross of Eden pollinated by a male seedling.

## GENERAL CHARACTERISTICS

Onslow is a black-fruited, pistillate variety, which first attracted interest because of its distinctive, rather rich flavor and juiciness. The variety is productive, and the berries are in loose, easily picked clusters. The berries are somewhat oblong and of a distinctly dull finish rather than shiny. They have excellent adherence to the stem. This variety should prove to be a very good, early, all-round market variety of the black type.

## TECHNICAL DESCRIPTION

*Vines*.—Medium vigorous to vigorous, fairly dense; cane growth tending to be short; foliage plentiful, medium-sized, rather disease-resistant, hanging on well; leaves generally cordate, with average serration; growing tips faintly reddish with red tendrils.

*Flowers*.—Pistillate; cluster of pistillate type, medium-sized.

*Fruit*.—Ripening early; stem of cluster 1 to  $1\frac{1}{2}$  inches long; cluster flat, loose, consisting of 1 to 7, generally 3 to 5, berries; berries of excellent adherence, the point of berry attachment being small, medium-sized, slightly oval, dull black; skin thin, fairly tough; pulp plentiful, very juicy, smooth but a little retentive of seed, medium acid, fairly sweet with rich, pleasant flavor; seeds small, broad in relation to length, sharp-pointed.

## ORTON

## ORIGIN

Orton was named for Orton Plantation and Gardens, one of the historic old rice plantations of the lower Cape Fear River, not far from Willard; in recent years it has become famous as an azalea and camellia garden. Orton, which has the same parentage as Topsail, resulted from crossing Latham<sup>4</sup> with pollen of Burgaw, which in turn resulted from a

<sup>4</sup> Described in HUSMANN, G. C., and DEARING, C. THE MUSCADINE GRAPES. U. S. Bur. Plant Indus. Bul. 273, 64 pp., illus. 1913.

cross of Thomas with pollen of the second perfect-flowered seedling. With two perfect-flowered selections in its parentage, Orton may also give rise to perfect-flowered seedlings.

#### GENERAL CHARACTERISTICS

Orton is a fine, white-fruited, pistillate variety much like Topsail and nearly as good (fig. 11). The berries are only medium-sized and ripen uniformly in fine clusters. The vine is vigorous and productive, and the foliage holds on well in the fall and protects the fruit. Generally the clusters, which consist of 6 to 12 berries, are round and compact with rather short stems; these characteristics make them a little difficult to pick. The flavor is sweeter than that of Scuppernong. The skin is rather thin and somewhat transparent: and the pulp is smooth and soft, comparable with that of Scuppernong. This variety would be appreciated in any vineyard.

#### TECHNICAL DESCRIPTION

*Vines*.—Vigorous, much like those of Topsail and nearly as vigorous; growth medium rangy, fairly droopy, fairly dense: foliage abundant, dense, disease-



FIGURE 11.—Fruit and leaves of the Orton, a white-fruited, pistillate muscadine grape sweeter than the Scuppernong.  $\times$  about  $\frac{1}{5}$ .



resistant, holding on well in the fall; leaves cordate, but lateral points not prominent; growing tips greenish yellow, with very few tendrils showing near the tip.

*Flowers*.—Pistillate; cluster medium-sized.

*Fruit*.—Ripening in midseason; stem of cluster  $\frac{1}{2}$  to  $\frac{3}{4}$  inch long; cluster round, compact, difficult to pick by the stem, consisting of 6 to 12 berries; berries of good adherence, the scar on a shelled berry being large, medium-sized, round, pearly yellow to pearly bronze; skin thin, tough; pulp plentiful, very sweet, of fine flavor, smooth, meaty, but not tough; seeds medium-sized to large, scar on the seed not prominent on specimens examined.

## PENDER

### ORIGIN

Pender was named for Pender County, N. C., in which the experimental vineyard is located. It resulted from a cross of Latham with a white-fruited, perfect-flowered seedling.

### GENERAL CHARACTERISTICS

Pender is another white-fruited, perfect-flowered muscadine grape (fig. 12). It is very productive. The berries have a yellower tinge than those of most white varieties. The vine is below average in vigor and in disease resistance and will probably need good fertilizing for best results. The fruit ripens later than that of Scuppernong, generally in clusters of only two or three berries. Although the flavor is good, it is not equal to that of some of the others described in this circular; though distinctive and different from that of Scuppernong, it is probably not so good to most tastes. Pender is a grape for collectors of varieties. It is not one of the best, but because it is distinctive it may be very useful to plant breeders.

### TECHNICAL DESCRIPTION

*Vines*.—Only fairly vigorous; growth weak, short; foliage not very abundant, below average in disease resistance; leaves rather small but of standard shape, smallness possibly associated with the lack of plant vigor as compared with that of some other varieties; growing tips yellowish green.

*Flowers*.—Perfect; cluster of male type, medium-sized.

*Fruit*.—Ripening late; stem of cluster  $\frac{1}{2}$  to 2 inches, mostly  $\frac{3}{4}$  inch, long; cluster small, loose; berries of good adherence, medium-sized, oval, decidedly yellowish green, when fully ripe yellower than those of most other varieties; skin medium thick, tough; pulp very scant, moderately juicy, of about average acidity, of average sweetness, smooth, fairly soft, with distinctive flavor, described by some workers as malic (apple-pear) flavor; seeds medium-sized, dark brown, pointed.

## STANFORD

### ORIGIN

Stanford was named some years ago for the late J. A. Stanford, a citizen of Willard, N. C., who was very helpful in many ways in the grape work. It was grown from seed of San Jacinto obtained from Denison, Tex.

## GENERAL CHARACTERISTICS

Stanford has already proved its worth in tests by cooperators throughout the Southeast. This white-fruited, pistillate variety (fig. 13) has about the same season as James and is later than Scuppernong: the berries are large like those of James and larger than those of Scuppernong. Although not particularly sweet, the fruit is of pleasant flavor when fully ripe and is particularly good when the vine is grown in sandy locations. Stanford is a good commercial



FIGURE 12.—Fruit and leaves of the Pender, a white-fruited, perfect-flowered muscadine grape.  $\times$  about  $\frac{7}{10}$ .



FIGURE 13.—Fruit and leaves of the Stanford, a pistillate muscadine grape, which has been characterized as a white James because it is to the white varieties what James is to the black ones.  $\times$  about  $\frac{4}{5}$ .

variety, because of the large size of the berries; the growth habit is much like that of Scuppernong, the vine being strong and vigorous. Although the fruit is borne in small clusters of only a few berries, the vines are productive.

#### TECHNICAL DESCRIPTION

*Vines*.—Vigorous, strong growing; canes open, upright, strong; foliage only moderately abundant, only fairly disease-resistant, tending to mature and fall early; leaves broadly cordate with coarse serrations, fairly broad for their length; growing tips yellowish green.

*Flowers*.—Pistillate; cluster of pistillate type.

*Fruit*.—Ripening about the same time as James, being moderately late; stem of cluster about 1 inch long; cluster round, consisting of 1 to 10 berries; berries of good adherence, very large, very slightly oblong, greenish pearl with russet specks and blotches; skin medium thick, leathery, but tender when cooked; pulp not very plentiful, but juicy, medium soft, tender, smooth, medium acid, with fairly good sugar content; berries noticeably sweeter when planted on sandy soil than when planted on heavy, moist bottom land; seeds large, normal in shape.



## TARHEEL

## ORIGIN

Tarheel was given its name as suggestive of North Carolina. It is the result of crossing Luola with a perfect-flowered selection, which in turn was the result of crossing Eden with the first perfect-flowered seedling.

## GENERAL CHARACTERISTICS

Tarheel is a highly productive, perfect-flowered variety, having clusters of 8 to 10 small, shiny, jet-black berries (fig. 14). The vine is very vigorous and healthy and bears large crops. When loaded with shiny black berries it is very attractive. The berries are juicy and excellent in flavor. Tarheel is suitable for the variety-collection or home plantings and for plant breeders. It is one of the best of the many black small-fruited seedlings that have been produced in the experimental vineyard. It is also one of the healthiest. Its foliage suggests its Luola parentage.



FIGURE 14.—Fruit and leaves of the Tarheel, a small, black, juicy, perfect-flowered muscadine grape of excellent flavor.  $\times$  about  $\frac{7}{10}$ .

## TECHNICAL DESCRIPTION

*Vines*.—Very vigorous, productive; growth rampant; foliage dense, very disease-resistant, holding on well and thus protecting the fruit; leaves cordate, crinkled, wavy, pointed; growing tips reddish green.

*Flowers*.—Perfect; cluster of male type, large.

*Fruit*.—Ripening in midseason; stem of cluster 1 to 2 inches long, making picking by cluster easy; cluster loose, open, irregular in shape, large, consisting of 5 to 15, generally 8 to 10, berries; berries of good adherence, small, round, jet black, shiny; skin thin, tough; pulp of average amount, very juicy, sweet with a delightful vinous flavor, smooth, tender, mildly acid, of medium sugar content, although berries taste sweet and have fine flavor.

## TOPSAIL

## ORIGIN

Topsail is a cross between Latham, a natural seedling found near New Bern, N. C., and Burgaw, a perfect-flowered variety derived by crossing Thomas with the second perfect-flowered seedling found (p. 5). Since perfect-flowered vines were used as the pollen parents in two generations, it is assumed that Topsail may carry this character and that it may appear in its seedlings. Although the parents Latham and Thomas were of the red-fruited type, Topsail has the greenish-yellow growing tips, tendrils, and petioles characteristic of white-fruited varieties. Both of these parents produce sweet fruit. The name "Topsail" (locally pronounced top'sul) was used to suggest high quality. Topsail, derived from the words "top" and "sail," is the name of an inlet on the Atlantic seaboard of the county where the variety Topsail originated.

## CHARACTERISTICS

Topsail is a white-fruited variety that has been unanimously rated as having a better flavor than Scuppernong, which was long considered as having the highest quality of any standard variety (fig. 15). The vine is very vigorous and fully as productive as that of the Scuppernong (fig. 16). Since Topsail is a pistillate variety, it does best on an overhead trellis with pollinizing varieties nearby. The foliage is relatively free from disease and hangs on well in the fall. The berries, which are borne in round, medium-sized clusters, are pearly green rather than pearly bronze like those of Scuppernong. This greenish color and the occasional presence of dark patches make the berries less attractive than those of Scuppernong, but the poor appearance is offset by the crispness and very fine, sweet flavor. The pulp is somewhat crisp and meaty like that of European grapes. The sugar content of the juice is about 2 percent higher (Brix scale) than that of Scuppernong. Although the fruit begins to ripen a little later than that of Scuppernong, the season is almost the same; Topsail is a mid-season, not a late, variety. The skin is medium thick and translucent, contrasting with the thick skin of Scuppernong.

## TECHNICAL DESCRIPTION

*Vines.*—Very vigorous, drooping, dense; canes long, wirelike, viny; foliage abundant, disease-resistant, hanging on well; leaves broadly cordate; veins depressed, prominent; growing tips very light yellow green, with long yellow-green tendrils at each node; tendrils near base of canes occasionally appearing forked, with one branch of fork a rudimentary fruit cluster.

*Flowers.*—Pistillate; cluster of pistillate type.

*Fruit.*—Ripening in midseason; stem of cluster 1 to 1½ inches long; cluster round, consisting of 1 to 8, usually 3 to 5, berries; berries of average adherence, but tending to shell off when fully ripe, large, round, green to pearly green—or light bronze when ripened in the sun; skin thin to medium thick, tough; pulp medium juicy, meaty, soft, crisp, mildly acid, very sweet, fine-flavored; seeds broad, stubby, medium-sized to large, more green in color when ripe than those of some other varieties, contrasting with large, long seeds of Scuppernong.



FIGURE 15.—Fruit and leaves of the Topsail, a white-fruited, pistillate muscadine grape with a better flavor than the Scuppernong.  $\times$  about  $\frac{4}{5}$ .





FIGURE 16.—A fruiting arm of Topsail muscadine grape.

## WALLACE

### ORIGIN

Wallace was named for the town of Wallace, N. C., which is near the experimental vineyard. As shown on page 8, it has Willard, James, Eden, and a male vine in its parentage.

### GENERAL CHARACTERISTICS

Like Willard, Wallace is self-fertile and white-fruited (fig. 17). Willard is relatively early, whereas Wallace is later in season as to both bloom and ripening of fruit. Wallace is recommended for use as a perfect-flowered variety to be planted with pistillate varieties, especially those that bloom late. Since there are few late white varieties and the fruit of Wallace is of good quality, Wallace therefore is a valuable variety in itself as a late-fruited sort. The berries are somewhat smaller than those of Scuppernong, but they ripen in large clusters. At times the variety may be very productive. The vines are vigorous, but the foliage seems to have little resistance to leaf diseases. If the variety is troubled by leaf diseases, the use of Bordeaux mixture is recommended.

### TECHNICAL DESCRIPTION

*Vines*.—Vigorous; fruiting arms long, but with a tendency for the laterals along the arms to be short; foliage abundant, readily attacked by black rot and other diseases, not protecting the fruit so well as desired; leaves large, cordate to nearly round; growing tips yellowish green.

*Flowers*.—Perfect; clusters of male type, large.

*Fruit*.—Ripening from midseason to late; stem of cluster about 1 to 1½ inches long; cluster loose, consisting of 2 to 15 berries; berries of good adherence, medium-sized, very slightly oval, yellow to pearly bronze; skin thin, tender; pulp juicy, soft, smooth, of above-average sweetness; seeds small, dark brown.



FIGURE 17.—Fruit and leaves of the Wallace, a white-fruited, perfect-flowered muscadine grape.  $\times$  about  $\frac{3}{5}$ .

## WILLARD

### ORIGIN

Willard was named for the town of Willard, N. C., where the muscadine experimental vineyard and breeding work are located. It resulted from a cross of two seedlings of the white type propagated at Arlington Experiment Farm.



## GENERAL CHARACTERISTICS

Willard is important because it is a perfect-flowered, productive, white-fruited grape (fig. 18) and can serve as a pollinizer for Scuppernong and other pistillate varieties. When it is used as a pollinizer, a

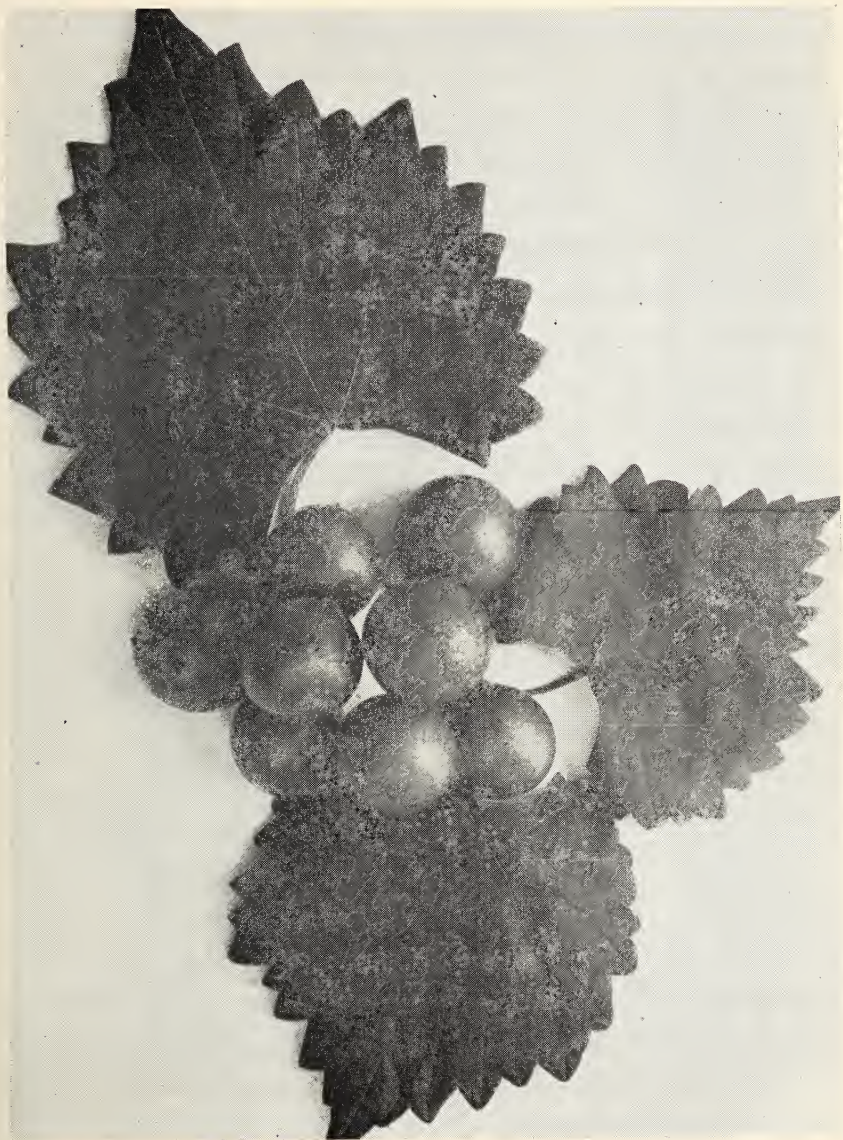


FIGURE 18.—Fruit and leaves of the Willard, a white-fruited, perfect-flowered muscadine grape.  $\times$  about  $\frac{4}{5}$ .



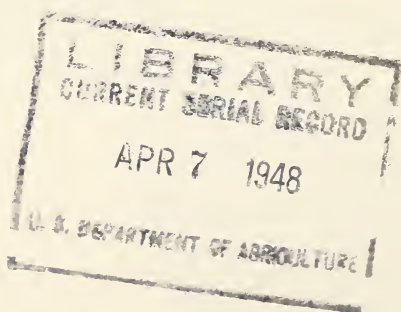
good plan is to set it in every third vine location in every third row, beginning with the second vine location in the second row. Although its fruit is not quite so good as that of Scuppernong, it is sufficiently like it to be entirely acceptable to wine makers. The fruit is borne in rather loose, open clusters; this openness is due to the fact that the cluster sets more fruit than the vine can ripen and therefore aborts some of the berries.

#### TECHNICAL DESCRIPTION

*Vines.*—Of average vigor, open, drooping; foliage sparse, somewhat subject to black rot and other diseases, maturing and falling early and thus exposing fruit to the sun; leaves typical of muscadine species; growing tips yellowish green.

*Flowers.*—Perfect; clusters of male type, large.

*Fruit.*—Ripening fairly early; stem of cluster about 2 inches long; cluster loose, of irregular form; berries of good adherence, medium-sized, slightly oval, greenish to bronze—depending on exposure to sun; skin medium thick, medium tough; pulp not abundant, moderately juicy, smooth, tenacious, liberating seeds with difficulty, mild to acid, medium sweet; seeds relatively small, dark.



U. S. GOVERNMENT PRINTING OFFICE: 1948



